

**MEETING MINUTES - Teleconference
HIPPI-6400 Optical Working Group
Thursday, September 12, 1996**

A teleconference was arranged by the HIPPI-6400 Optical Interconnect Working Group to coincide with the HIPPI-6400 meeting held in Albuquerque. The teleconference was scheduled for 2:00pm (Mountain Daylight Time). Discussion was to center around continued development of the HIPPI-6400 optical specification and addressing issues surrounding the electrical/optical interface, laser eye safety, and optical compatibility/interoperability of the interconnection with the fiber and the board electronics.

I. Introductions started the session. In attendance:

Stan Swirhun, Mike Dudek, Mark Stratton, Alan Iguchi - Vixel
Steve Joiner - HP
Schelto van Doorn - Siemens
Christie Rice, Dan Hicks - Honeywell
Dan Brown - AMP
Ali Ghiasi - Sun
Michael Griffin - 3M
Robert Clarkson - E-Systems
Emile Sayegh - W.L. Gore

II. Swirhun set the agenda for the call as follows:

- 1) Introductions / Expectations of the Meeting
- 2) Modifications / Additions for the Agenda
- 3) Schedule for HIPPI-6400 Optical Standards Development
- 4) Electrical Specifications: General
- 5) Optical Specifications: General
- 6) Connector / Mechanical Specifications
- 7) Issues / Action Items
- 8) Next Meeting Schedule

III. Discussions

A. A brief discussion of the task before us followed with the group agreeing that it will establish two specifications:

- 1) HIPPI-6400 1000 Mb/s with 12 channels
- 2) HIPPI-6400 500 Mb/s with 12 channels. This approach is as outlined in our August Honolulu meeting.

A. Electrical Interface Specifications

- 2) Joiner agreed to drive the electrical spec issues, if possible within a week, and report on the reflector. The input point of contact is primarily the SGI team, with Hansel Collins the lead.
- 3) General agreement and urging that the HIPPI-6400 electrical specifications seek to: a) satisfy the HIPPI-6400 technical committee, and b) allow general purpose use by allowing compatibility with existing high speed interface standards. The group agreed this was the challenge before the electrical specification.
- 4) Joiner suggested, and received positive response to the suggestion of defining both 'normative' and 'informative' specification contributions.

- 5) Joiner proposed an electrical interface which would be a “hybrid” combination of PECL and LVDS. Some discussion ensued with Michael Griffin summarizing what was proposed for the copper interconnect. Joiner said he will elaborate his proposal on the HIPPI reflector for more inputs.

A. Optical Interface Specifications

3) Laser Eye Safety

One original goal of this meeting was to settle the eye safety question, since link budgets depend critically upon the maximum launched optical power. A great deal of the discussion focused on this topic. - The relevant amendment to the IEC 825-1 document was noted (76/134/CDV). - Only a few participants had experimental or modeled data on maximum signal launch power for eye safety. It was agreed that the basis of comparison would be source arrays 12 elements wide at 250µm pitch, operating 820-860nm; source NA must also be specified. Steve Joiner reported that HP experimental data would be taken by the Oct. ANSI meeting. Stan Swirhun reported recent Vixel experimental data on 4-channel source modules that suggested 12 element array launches with per element power as high as -5 dBm could meet the IEC amended eye safety requirements. The effective NA was not well characterized in this experiment, however. Swirhun also reported that modeling results for a similar 12 element array suggested that per element power < -6.5 dBm per element was required. Swirhun offered to place these and subsequent data on the reflector. Schelto van Doorn offered to bring modeled and experimental data to St. Petersburg.

- 4) “Strawman” optical specifications were discussed. As a starting point, it was suggested that HIPPI-6400 follow the FC-0 functional optical spec for shortwave multimode without OFC (100-M5-SN-I) with the following key exceptions - open for discussion on the HIPPI reflector:

- | | |
|-----------------------------------|------------------|
| a) Optical launch power max. | <-6dBm |
| b) Optical receive min. | <-17dBm |
| c) Extinction Ratio | 6-8dB (but <9dB) |
| d) Wavelength | 820-860nm |
| e) Maximum Reach | 200m |
| f) Eye opening, jitter, rise/fall | t.b.d. |
| g) Link budget | <6dB* |

(*There seem to be overall concern regarding maintaining the 6dB budget with the advent of lowering the maximum launch power in order to meet laser eye safety. More work was requested from: 3M (Griffin), Honeywell (Rice), HP (Joiner) and Vixel (Swirhun/Dudek) for presentation at the October meeting in St. Petersburg which would be factored into the HiPPI-6400 specification. Any preliminary information put on the reflector prior to the October meeting would be helpful.)

A) Optical Connector Specifications

In preparation for the October meeting, the evaluation criteria and mechanical specifications were reviewed. Vixel (Dudek) felt that the return loss spec may not be needed based on some preliminary tests. Brown (AMP) questioned the need to meet the 500 cycle mating/demating durability requirement. It was suggested that connector manufacturers put preliminary test results, any contentious issues, etc. on the reflector so that the group can be queued up for the October meeting discussion.

E) Fiber skew

5) The proposed specification (Swirhun) was:

- max. skew in one fiber ribbon 5.0 ns
- max. skew between ribbons 2.5 ns
- max. skew in Tx + Rx 1.0 ns

2) Concern was raised about having two 12-fiber ribbon cables for the 12-wide at 500Mb/s interface option. Sayegh (Gore) suggested a molded dual “pod” fiber ribbon (holding two 12-fiber ribbons) which would enable equalized lengths in point-to-point connections. Skew would be contained within the 5ns proposed spec.

The call was concluded at 3:15pm. Depending on the reflector traffic and the wishes of the group, another teleconference call may be scheduled on September 26th.